

Claims

[c1] What is claimed is:

1.A method of forming and testing a phase shift mask (PSM) comprising:

providing a mask substrate, a surface of the mask substrate comprising a main field region and a blank periphery region surrounding the main field region;

forming a first pattern, at least one second pattern and at least one third pattern within the main field region to form the PSM;

using the PSM to perform a pattern transferring process to transfer the first pattern, the second pattern and the third pattern to a semiconductor wafer; and

using the second and third patterns transferred to the semiconductor wafer to perform a PSM test.

[c2] 2.The method of claim 1 wherein the blank periphery region is employed as an anti-static charge border of the PSM.

[c3] 3.The method of claim 1 wherein the PSM test comprises at least one of a registration test, a phase angle test and a transparency test.

- [c4] 4.The method of claim 3 wherein the second pattern is positioned on the border of the main field region, and the transferred second pattern on the semiconductor wafer is employed to perform the registration test.
- [c5] 5.The method of claim 3 wherein the third pattern is positioned on the center of the main field region, and the transferred third pattern on the semiconductor wafer is employed to perform the phase angle test and the transparency test.
- [c6] 6.The method of claim 1 wherein the first pattern is a portion of a circuit pattern.
- [c7] 7.The method of claim 1 wherein either the first pattern, the second pattern or the third pattern is composed of the mask substrate, a phase shift layer and a screen layer.
- [c8] 8.The method of claim 7 wherein either the second pattern or the third pattern comprises a cross-shaped pattern composed of the mask substrate and the phase shift layer.
- [c9] 9.The method of claim 7 wherein the mask substrate comprises quartz, the phase shift layer comprises molybdenum silicide (MoSi), and the screen layer comprises chromium (Cr).

- [c10] 10.The method of claim 1 wherein the semiconductor wafer comprises a photosensitive layer positioned on a surface of the semiconductor wafer.
- [c11] 11.The method of claim 10 wherein the semiconductor wafer comprises a thin film layer positioned below the photosensitive layer.
- [c12] 12.The method of claim 1 wherein the pattern transferring process comprises a lithography process and an etching process.
- [c13] 13.A method of forming and testing a PSM comprising:
providing a mask substrate, a surface of the mask substrate comprising a main field region and an anti-static charge border region surrounding the main field region;
forming a first pattern and at least one second pattern within the main field region to form the PSM;
using the PSM to perform a pattern transferring process to transfer the first pattern and the second pattern to a semiconductor wafer; and
using the second pattern transferred to the semiconductor wafer to perform a PSM test.
- [c14] 14.The method of claim 13 wherein the first pattern is a portion of a circuit pattern.

- [c15] 15.The method of claim 13 wherein the second pattern is positioned on either the border or the center of the main field region.
- [c16] 16.The method of claim 13 wherein either the first pattern or the second pattern is composed of the mask substrate, a phase shift layer and a screen layer.
- [c17] 17.The method of claim 16 wherein the second pattern comprises a cross-shaped pattern composed of the mask substrate and the phase shift layer.
- [c18] 18.The method of claim 17 wherein the PSM test comprises a registration test, a phase angle test and a transparency test.
- [c19] 19.The method of claim 13 wherein the semiconductor wafer comprises a photosensitive layer position on a surface of the semiconductor wafer.
- [c20] 20.The method of claim 19 wherein the semiconductor wafer comprises a thin film layer positioned below the photosensitive layer, and the pattern transferring process comprises a lithography process and an etching process.